

WHAT IS CLAIMED IS:

- 1 1. A distributed computer network, comprising:
2 a plurality of processors, and
3 at least one communication medium for
4 interconnecting the plurality of processors:
5 wherein the plurality of processors are
6 logically arranged such that each processor can
7 operate at a top level of a hierarchy that includes
8 at least a significant number of the plurality of
9 processors by sending a message to at least one
10 logically neighboring processor;
11 wherein the message is disseminated
12 throughout the hierarchy by each processor that
13 receives the message forwarding the message to at
14 least one logically neighboring processor such that
15 each processor in the hierarchy receives the message
16 only once.
- 1 2. The distributed computer network of claim 1,
2 wherein the at least one communication medium includes at
3 least one physical interconnection unrelated to the
4 logical arrangement of the plurality of processors.

1 3. The distributed computer network of claim 1,
2 wherein each processor that receives the message forwards
3 the message to one or two logically neighboring
4 processors.

1 4. The distributed computer network of claim 1,
2 wherein the plurality of processors include a processor
3 situated at a logical center and the remaining processors
4 are logically arranged around the logical center.

1 5. The distributed computer network of claim 4,
2 wherein the plurality of processors are logically arranged
3 in a polygonal configuration having an even number of
4 sides.

1 6. The distributed computer network of claim 4,
2 wherein the plurality of processors are logically arranged
3 in a three dimensional configuration.

1 7. The distributed computer network of claim 4,
2 wherein each processor tends to move to a location closer
3 to the logical center if said location is not occupied by
4 another processor.

1 8. The distributed computer network of claim 7,
2 wherein each processor further tends to move in a
3 predetermined direction to an adjacent location on the
4 same logical level if said adjacent location is not
5 occupied by another processor.

1 9. The distributed computer network of claim 4,
2 wherein each processor tends to switch positions with an
3 adjacent processor closer to the logical center when the
4 adjacent processor has less available bandwidth than said
5 processor.

1 10. The distributed computer network of claim 1,
2 wherein the message relates to a broadcast of data.

1 11. The distributed computer network of claim 1,
2 wherein the message relates to a search for information
3 selected from the group consisting of specified data and a
4 specified processor.

1 12. A distributed computer network comprising:
2 a collection of computers logically arranged
3 such that a first computer of the collection of computers
4 is situated at a logical center of the collection of
5 computers, wherein a plurality of computers from the
6 collection of computers form a series of concentric
7 polygons around the first computer; and
8 wherein each computer in the collection of
9 computers can act as a top computer in a hierarchy of
10 computers, said hierarchy including at least a subset of
11 the collection of computers by:
12 said top computer sending a message along
13 each of at least one radial, each of said at least
14 one radial comprising a line of logically adjacent
15 computers in the collection of computers that
16 logically extends radially from said top computer;
17 and
18 at least one lower level computer, of the
19 collection of computers, located on one of said
20 radials further forwarding the message along an
21 indirect radial, each indirect radial comprising a
22 line of logically adjacent computers in the
23 collection of computers that logically extends

24 radially from said at least one lower level computer
25 but does not logically intersect any of the at least
26 one radial.

1 13. The distributed computer network of claim 12,
2 wherein each computer not located on an outermost edge of
3 the collection of computers has the same number of radials
4 extending therefrom as there are sides of the concentric
5 polygons.

1 14. The distributed computer network of claim 12,
2 wherein each computer operates to:
3 move to a position closer to the logical center
4 when said closer position is not occupied by another
5 computer; and
6 move, in one of a clockwise and a
7 counterclockwise direction, to a position at the same
8 level as a current position of the computer when the same
9 level position is not occupied by another computer.

1 15. The distributed computer network of claim 14,
2 wherein each computer further operates to prevent
3 neighboring computers from moving during each of said
4 moving to a closer location and moving to a same level
5 position.

1 16. The distributed computer network of claim 12,
2 wherein each respective computer in the collection of
3 computers stores information relating to each of a
4 plurality of subordinate computers logically connected to
5 and located around the respective computer.

1 17. The distributed computer network of claim 16,
2 wherein a top computer in the collection of computers can
3 initiate a search for content on the plurality of
4 subordinate computers that correspond to each computer in
5 the collection of computers by sending said message.

1 18. The distributed computer network of claim 12,
2 wherein said message is selected from the group consisting
3 of broadcast data, a search parameter, and update
4 information.

1 19. The distributed computer network of claim 12,
2 wherein, other than the top computer, each computer on a
3 radial forwards the message to two other computers and
4 each computer not on a radial forwards the message to one
5 other computer.

1 20. The distributed computer network of claim 19,
2 wherein each of the computers in the collection of
3 computers is forwarded the message only once.

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1 21. A method for communicating in a computer
2 network, comprising:
3 logically arranging a plurality of computers
4 around a first computer situated at a logical center of
5 the plurality of computers;
6 initiating a message at a top computer selected
7 from the plurality of computers;
8 sending the message from the top computer along
9 at least one series of logically adjacent subordinate
10 computers that logically extends radially from the top
11 computer, the plurality of computers including said
12 subordinate computers; and
13 forwarding the message, from at least one of the
14 subordinate computers that logically extend radially from
15 the top computer, along at least one series of logically
16 adjacent computers that logically extends radially from
17 the at least one subordinate computer but that does not
18 intersect any of the series of logically adjacent
19 subordinate computers that logically extend radially from
20 the top computer.

1 22. The method of claim 21, wherein the step of
2 logically arranging comprises establishing a plurality of
3 logically neighboring computers for each computer, wherein
4 each computer has no more than a predetermined number of
5 logically neighboring computers, and wherein the plurality
6 of computers are evenly distributed around the first
7 computer.

1 23. The method of claim 21, further comprising the
2 step of switching positions of at least two adjacent
3 computers to move computers with lower bandwidth
4 availability away from the logical center of the plurality
5 of computers.

1 24. The method of claim 21, further comprising the
2 step of delaying sending of the message from the top
3 computer if a bandwidth utilization of the plurality of
4 computers is above a predetermined threshold.

1 25. A method for logically configuring a collection
2 of computers, comprising:

3 selecting a computer to serve as a logical
4 center of the collection of computers;

5 adding computers to the collection of computers
6 to logically configure the computers into a plurality of
7 concentric polygons, wherein each added computer operates
8 to:

9 find a computer in the collection of
10 computers;

11 follow one of a radial and an indirect
12 radial that includes the found computer to a
13 collection edge, said radial comprising a series of
14 logically adjacent radial computers that logically
15 extend from the logical center, and said indirect
16 radial comprising a series of logically adjacent
17 computers that logically extend from one of the
18 radial computers, wherein the collection edge
19 comprises a logically outermost computer on said one
20 of the radial and the indirect radial; and

21 logically attach to a computer the
22 collection of computers on the collection edge.

1 26. The method of claim 25, further comprising the
2 step of moving each added computer to a neighboring
3 logical position that is logically closer to the logical
4 center of the collection of computers if said closer
5 neighboring logical position is not currently occupied by
6 one of the computers in the collection of computers.

1 27. The method of claim 26, further comprising the
2 step of rotating each added computer to a neighboring
3 logical position on the same logical level as the added
4 computer if the same level neighboring logical position is
5 not currently occupied by one of the computers in the
6 collection of computers.

1 28. The method of claim 27, wherein the step of
2 rotating comprises rotating in a preselected one of a
3 clockwise and a counterclockwise direction.

1 30. The method of claim 25, wherein each of the
2 plurality of concentric polygons has the same number of
3 sides and has an even number of sides.

1 31. A method for logically configuring a collection
2 of computers, comprising:

3 selecting a computer to serve as a logical
4 center of the collection of computers;

5 arranging computers from the collection of
6 computers such that the collection of computers are
7 logically configured to form a plurality of successively
8 higher concentric polygon levels around the logical
9 center;

10 adding a computer to the collection of
11 computers;

12 logically connecting the added computer to a
13 computer in the collection of computers, located at a
14 collection edge, wherein the collection edge comprises a
15 logical outer edge of the collection of computers and
16 forms at least a partial concentric polygon level around
17 the plurality of concentric polygon levels; and

18 repeating the steps of:

19 changing a logical location of the added
20 computer to a next lower concentric polygon level if
21 a computer in the collection of computers is not
22 situated at a logical position that neighbors the

23 added computer at the next lower concentric polygon
24 level; and
25 changing a logical location of the added
26 computer to a logically adjacent position on a
27 current concentric polygon level of the added
28 computer if a computer in the collection of computers
29 is not situated at said logically adjacent position.

1 32. The method of claim 31, further comprising the
2 step of sending a message from a top computer of the
3 collection of computers to each of a plurality of
4 neighboring radial computers, each neighboring radial
5 computer forwarding the message to another neighboring
6 radial computer and to a neighboring indirect radial
7 computer, such that the message is forwarded to each
8 computer in the collection of computers only once.

1 33. The method of claim 31, wherein the collection
2 of computers comprises one of a collection of caching
3 computers and a collection of non-caching computers,
4 wherein each caching computer stores information relating
5 to a corresponding collection of caching computers.

1 34. A computer network, comprising:

2 a collection of caching computers logically
3 arranged such that a first caching computer is situated at
4 a logical center of the collection of caching computers,
5 wherein the remaining caching computers are logically
6 arranged to form at least one concentric polygon around
7 the first caching computer;

8 at least one collection of non-caching
9 computers, each respective collection of non-caching
10 computers logically arranged to form a plurality of
11 successively higher concentric polygon levels around a
12 respective caching computer that stores information
13 relating to the respective collection of non-caching
14 computers;

15 at least one communication medium providing a
16 physical interconnection between the caching computers in
17 the collection of caching computers and the non-caching
18 computers in the at least one collection of non-caching
19 computers, said physical interconnection unrelated to said
20 logical arrangements; and

21 at least one of the collection of caching
22 computers and the at least one collection of non-caching
23 computers logically arranged such that a message

24 originating at a top computer is forwarded along each of
25 at least one radial, each said radial comprising a line of
26 logically adjacent computers that logically extends
27 radially from the top computer, and wherein a plurality of
28 computers forming the radial further forward the message
29 along an indirect radial, each said indirect radial
30 comprising a line of logically adjacent computers that
31 logically extends radially from a corresponding one of the
32 plurality of computers and that does not intersect any of
33 the at least one radial.

1 35. The computer network of claim 34, wherein each
2 caching computer operates to determine whether its
3 available bandwidth is greater than an available bandwidth
4 of a logically adjacent caching computer logically closer
5 to the first caching computer and to switch positions with
6 the logically adjacent caching computer when the available
7 bandwidth of the caching computer is greater than the
8 available bandwidth of the logically adjacent caching
9 computer.

1 36. The computer network of claim 35, further
2 comprising at least one added non-caching computer,
3 wherein the added non-caching computer logically attaches
4 to a collection of non-caching computers associated with a
5 caching computer currently situated at the logical center
6 of the collection of caching computers.

1 37. The computer network of claim 34, wherein the
2 information relating to the respective collection of non-
3 caching computers comprises an index of data stored on the
4 respective collection of non-caching computers.

1 38. The computer network of claim 34, further
2 comprising at least one added computer, wherein the at
3 least one added computer is assigned as one of a caching
4 computer and a non-caching computer based on an available
5 bandwidth of the at least one added computer.

1 39. The computer network of claim 34, wherein the
2 message comprises one of broadcast information and search
3 request data.

1 40. A distributed computer network, comprising:
2 a collection of computers;
3 means for an added computer to locate the
4 collection of computers;
5 means for the added computer to establish a
6 connection to the collection of computers;
7 means for each computer in the collection of
8 computers, including the added computer, to establish a
9 logical arrangement such that each computer in the
10 collection of computers can act as a top level of a
11 hierarchy, wherein the hierarchy includes at least a
12 substantial number of the computers in the collection of
13 computers.

1 41. The distributed computer network of claim 40,
2 wherein the hierarchy comprises a set of member computers,
3 a membership of which depends upon a logical location of
4 the computer that acts as the top level of the hierarchy.

1 42. The distributed computer network of claim 40,
2 further comprising means for the computer that acts as the
3 top level of the hierarchy to initiate a search for one of
4 a specified computer and specified data.

1 43. The distributed computer network of claim 42,
2 wherein each computer in the collection of computers
3 includes a searchable index of the contents of the
4 computer for facilitating said search.

1 44. The distributed computer network of claim 40,
2 further comprising means for the computer than acts as the
3 top level of the hierarchy to broadcast information
4 throughout the hierarchy.

1 45. The distributed computer network of claim 40,
2 further comprising means to control a bandwidth
3 utilization of the collection of computers.

1 46. The distributed computer network of claim 40,
2 further comprising a plurality of lower level computers,
3 wherein information regarding the lower level computers is
4 stored in a respective one of the computers in the
5 collection of computers.

1 47. The distributed computer network of claim 40,
2 further comprising means for rebuilding a logical
3 arrangement of the collection of computers following a
4 loss of at least one computer from the collection of
5 computers.

1 48. The distributed computer network of claim 40,
2 further comprising means for distributing software updates
3 throughout the collection of computers.

1 49. The distributed computer network of claim 40,
2 wherein each computer in the collection of computers
3 includes a dynamic physical address.

1 50. The distributed computer network of claim 40,
2 further comprising means for generating the logical
3 arrangement to substantially minimize a logical distance
4 between a logical center of the collection of computers
5 and a logical collection edge.